

Surface Water Concerns Surrounding the 903 Pad Remediation
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Technical Summary: The 903 Pad Remediation will be required to meet two objectives. The first will be to remove or stabilize soils containing radionuclides that exceed a yet-to-be-determined, health-based action level. The second objective will be to contribute to the Site's ability to meet surface water quality standards for plutonium and americium.

The Actinide Migration Evaluation group (AME) has been commissioned by the Site to model erosion rates and to predict the residual soil contamination concentrations that have the potential to cause exceedances of surface water quality standards. The AME completed an extensive study of soil erosion, sediment transport and associated movement of Pu 239/240 and Am 241 by overland surface water flows to determine soil contamination levels that would be protective of water quality at closure. The 100 year average annual erosion rate for Site watersheds is about 0.1 tons per acre, which results from about 4% of the precipitation falling on the Site leaving as runoff. When averaged across the Site, this results in an annual erosion depth of 0.02 mm. The AME identified several areas that have the greatest potential for erosional actinide transport. These include areas near the old firing range (southeast of the 903 Pad), the Woman Creek watershed between Pond C-1 and the Mower Diversion, and areas within the South Walnut and Walnut Creek Drainages. The AME models predict that a cleanup level of 10 pCi/g will be needed to ensure that the surface water quality standard for Pu (0.15 pCi/l) will not be exceeded.

The contaminated lands around and to the east of the 903 Pad lie primarily within the Woman Creek watershed. Much of the runoff from the area (portions of which are disturbed) is captured in the South Interceptor Ditch (SID), which in turn is captured in Pond C-2. Pond C-2 is discharged into Woman Creek, albeit infrequently (for example, no discharges are anticipated at all this year. The Woman Creek watershed below Pond C-2 lies in undisturbed mesic mixed grassland. Water quality monitoring results since October 1996 from these three areas (that is, the SID, Pond C-2 and Woman Creek at Indiana) for total Pu are as follows, in pCi/l:

	<u>SID</u>	<u>Pond C-2</u>	<u>Woman Cr.</u>
Minimum	0.001	0.000	0.000
Mean	0.083	0.053	0.005
Maximum	0.802	0.451	0.037

Very high flows produce higher Pu concentrations in the SID; during the extremely high runoffs in May 1995, a Pu concentration of 2.3 pCi/l was recorded. Pu levels in Woman Creek have remained well below the standard (although no sample is available from May of 1995), and there is a general trend towards decreasing levels of Pu from the SID to Pond C-2 to Woman Creek. This shows the effectiveness of the current stormwater diversion system in Woman Creek, even given the fact that there has been no source removal from the 903 Pad. It also shows the potential usefulness of similar diversions as part of the ultimate 903 Pad remedy.

Policy perspective: Model results indicate that in order for excavation to be effective in protecting surface water quality, soil contamination would need to be removed to well below any health-based action level currently being considered, with the attendant risks and drawbacks of large-scale excavation. On the other hand, actual sampling data show the effectiveness of an engineered barrier and a well-vegetated watershed in controlling in-stream radionuclide levels. This suggests that techniques such as barriers and watershed improvements be considered as part of the overall remedy, especially when the goal is to protect surface water quality.